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BULLETIN No. 1

Aiken Lake Area
North-Central British Columbia

by

DOUGLAS LAY

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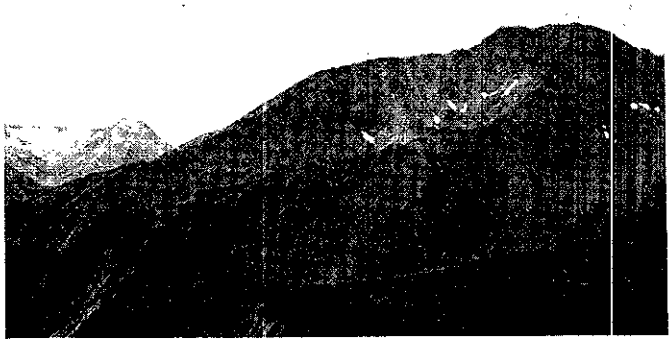
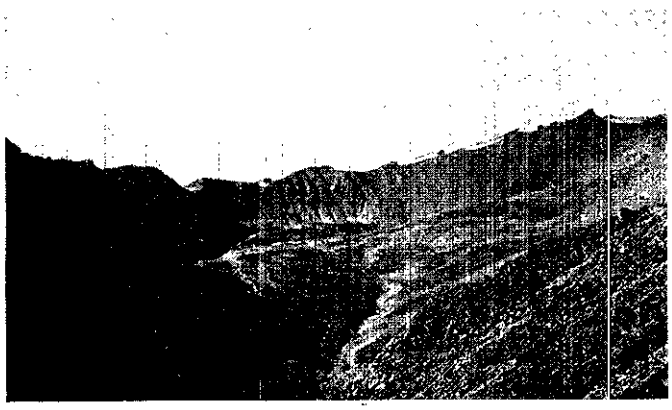
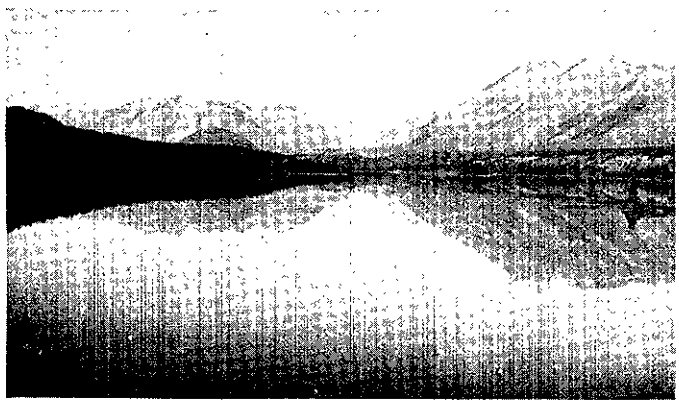


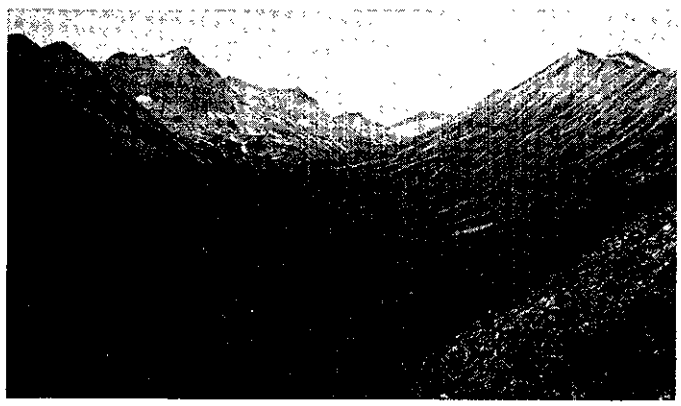
Glacial cirque on west side of Porphyry Creek.



Cirque at head of tributary of Croydon Creek.



Aiken Lake, looking west.



Headwaters of Croydon Creek.

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AIKEN LAKE AREA

Introduction

Aiken Lake area is defined as a strip of country about 30 miles long and 10 miles wide, trending north-west through and east of Aiken and Uslika Lakes. These lakes are near the headwaters of the Mesilinka and Osilinka Rivers respectively, (see Fig. 1).

The earliest known mining activity in this region was the discovery of placer-gold on Jimmay Creek in 1899 by James May, one of the pioneer prospectors in the northern part of the Province. This was immediately followed by some work on the creek by an English syndicate. Subsequently, save for the individual efforts of a few prospectors, the region was inactive for many years. Discovery of the Ferguson and Childhood's Dream to the east about in 1925, doubtless stimulated the revival of prospecting in the adjoining Aiken Lake area, to which, at that time, attention was drawn by the reports of the Geological Survey, Canada, and of the Minister of Mines, British Columbia.

Systematic prospecting by the Consolidated Mining and Smelting Company of Canada, Limited, commenced about in 1927, led to the discovery by E. Bronlund and other members of the Company's staff of the lode-mineral properties described in the body of this report. Since 1930, the company has done a total underground development footage of 4497 feet on these properties. A disastrous bush-fire on Croydon Creek in 1938 entirely destroyed the well-equipped camp constructed by this company on its Croydon group, and led to the suspension of operations in the area for the time being.

The best way to reach the area is by a winter road, completed in 1939, from Germansen Landing, to which the motor-road from Fort St. James via Manson Creek was also finished in 1939. The distance from Fort St. James to Germansen Landing is about 140 miles. As shown on Fig. 1, the distance by this winter road from Germansen Landing to Uslika Lake is about 51 miles and to Aiken Lake 95 miles. Another winter road from Old Hogem connects with the above road at a point 12 1/2 miles north of Old Hogem. As yet, there are no bridges across the major streams, and during the open season the Omineca, Mesilinka, and Osilinka Rivers can be forded only at low stages of water, at points shown on Fig. 1.

The Omineca River may be crossed by boat or scow at Germansen Landing at all stages of water. A motor-road 40 miles in length connects Old Hogem with Takla Landing, and this

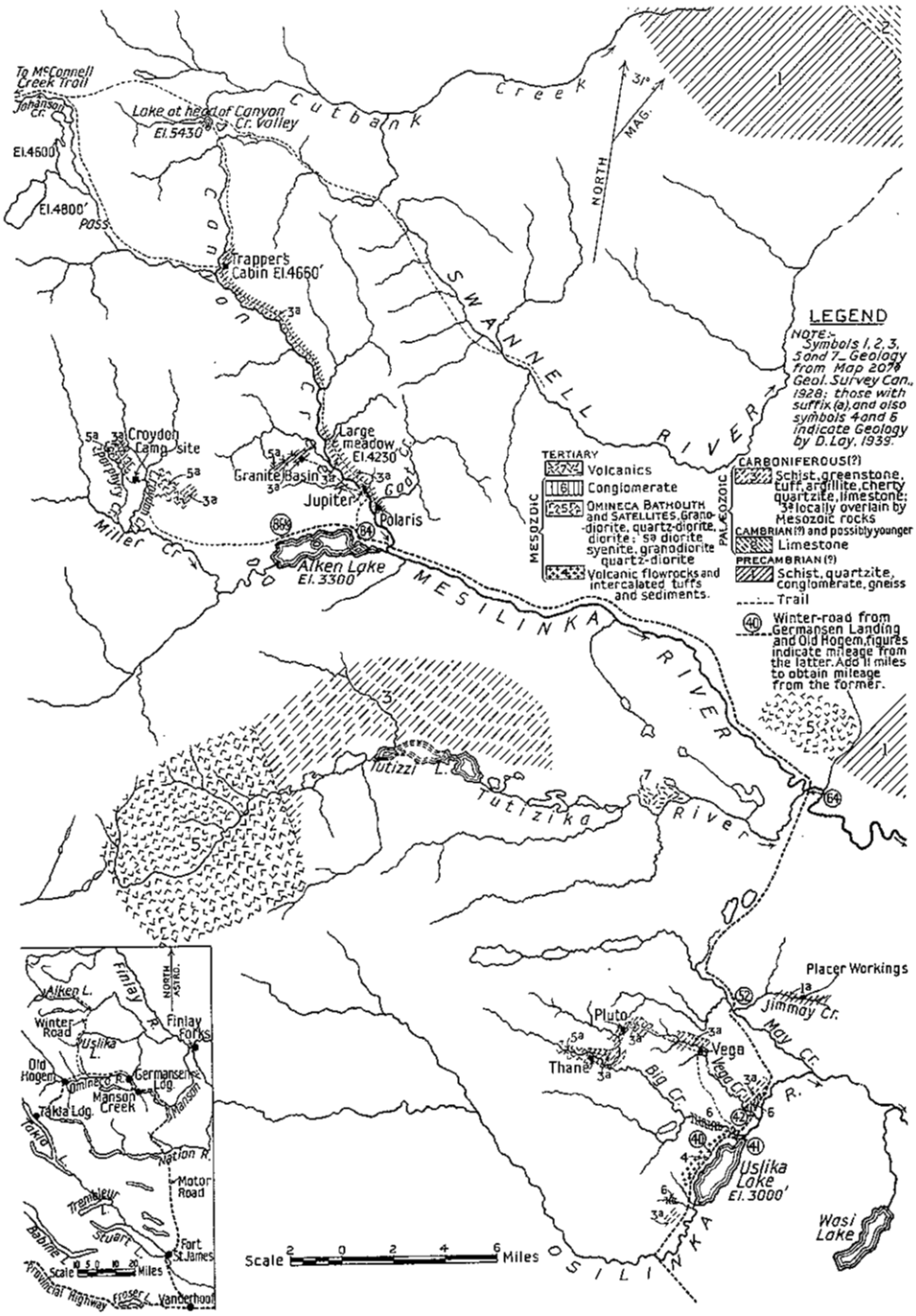

Fig. 1.
Aiken Lake Area.

year a motor-truck was driven from the latter point to Uslika Lake at the lowest stage of water.

Alternatively, both Uslika and Aiken Lakes may be readily reached by airplane from Fort St. James, as both these lakes afford excellent landings. The time occupied in the flight is about 1 1/4 hours to Uslika Lake, and about 1 1/2 hours to Aiken Lake.

An account of the geology pertinent to part of the area is given in Geological Survey, Canada, Summary Report, 1927, Part A. The topographical map used in the compilation of this report and reproduced herein, is the one published by the Department of Lands, British Columbia, and the names of creeks in this report are those given on this map. Where no name is given, local names have been inserted for the sake of clarity. Elevations are taken with reference to Aiken Lake as 3,300 feet, and Uslika Lake as 3,000 feet, as given in the Department of Lands map.

The following Annual Reports of the Minister of Mines, British Columbia, mention properties referred to in the preceding paragraphs: Years 1899 and 1935 (placer occurrence on Jimmay Creek); years 1926 and 1928 (Ferguson); year 1930 (Childhood's Dream); years 1926, 1928, and 1929 (prospecting in the area).

Topography and Glacial Geology

The area is mountainous and the western part extremely rugged, the mountains reaching elevations of 7,000 feet or more in some instances in the extreme west where many glaciers still exist. Dissection by the contained streams is deep, and the maximum relief exceeds 3,000 feet. The region is covered with heavy timber-growth and vegetation below timber-line or an elevation of about 4,800 feet. An important feature is the great width of the main valleys and their low gradient, which greatly facilitates road construction. For example, the newly-constructed winter road between Uslika and Aiken Lakes, a distance of 43 miles, rises barely 300 feet, with no intervening sharp ascent or descent. Again, the total length of the valley occupied by Canyon Creek is about 27 miles, the minimum width is about 1 mile, the maximum width about 3 miles; and the average gradient of the floor, about 1 1/2 per cent.

A prominent feature is the multiplicity of glacial cirques, and it is evident that although many of the loftiest peaks stood out as nunataks above the ice-sheet which formerly covered the entire area; nevertheless, the rugged nature

of many high mountains is due to glacial-sculpturing. The Tertiary valleys have in most cases been converted into a wide U-shape by valley glaciation, and tributary valleys, themselves heavily glaciated, are hanging. Especially rugged are the northern mountain slopes, where cirque-erosion was most pronounced. Incision of adjoining cirques has produced many high spurs and rugged, saw-tooth ridges which greatly contribute to the grandeur of the scenery.

The combined effect of intense Tertiary and Pleistocene erosion has been to dissect mountain ranges deeply and widely, so that viewed from the level of the main valleys the latter appear to be flanked by individual mountains rather than by ranges. It is only when a general view of the area is obtained from a high elevation that it is apparent that in most cases the wide tributary valleys terminate in glacial cirques.

Doubtless due to the elastic rebound following the disappearance of the ice-sheet, all streams are in active rejuvenation influenced like all Arctic-slope drainage by the master rejuvenation in progress on the Peace River. As a result an extensive system of gorges and canyons has been incised in the floors of many of the wide valleys. These canyons probably are not wholly of post-Glacial age, and incision was likely commenced in Pleistocene time during a retreat of ice. Some are of impressive size and striking examples are the gorges of Canyon and Goat Creeks; both of which reach a maximum depth of about 400 feet, and the former is some miles in length.

That the ice-sheet over-rode many high mountains, is proved by the presence of erratics at high elevations. For example, an erratic of quartz-diorite about 2 feet by 2 feet was found at elevation 6,175 feet, 175 feet below the summit of the mountain on the north bank of the Osilinka River, immediately north of Uslika Lake. That the movement of the ice sheet was south-eastward, is proved not only by the nature of erratics, but also by the fact that glacial and post-Glacial gravel, found on the banks of the Osilinka River, is composed almost entirely of pebbles and boulders of batholithic rock that must have originated from the Eastern batholith which closely borders the area of the west.

A very thin cover of glacial debris, and an entire absence of boulder-clay and slum deposits are striking features. It is evident that once-existent glacial debris has been largely swept out of the area by the enormous volumes of water which must have been in circulation during the final retreat of the ice-sheet. The absence of slum denotes that that cir-

culation was unimpeded by any damming by glacial debris. In the master valleys, the wide rock-floors of the Tertiary valleys are clearly discernible above the canyons in which the streams now flow.

Bed-rock Geology.

The area borders the eastern flank of the Eastern batholith, a granitic mass trending north-westward, and extending from the eastern part of the Cariboo district through the Manson Creek area and the headwaters of the Osilinka, Mesilinka, Ingenika, and Finlay Rivers to the Two Brothers Lake region. (This batholith is also named "Omineca" and "Cassiar-Omineca," but as neither of these terms indicates its established south-eastward continuation, the term "Eastern" is used, as it is the most easterly of the three batholiths which cross the northern part of the Province, namely, the Coast Range, Central, and Eastern batholiths.)

To cite Dolmage (page 28, Summary Report, 1927, Part A, Geological Survey, Canada): "The rocks of the Omineca batholith are chiefly granodiorite, quartz-diorite and diorite... The age of these intrusions is doubtful beyond the fact that they are post-Carboniferous."

The present examination did not include that of the Eastern batholith itself, which lies immediately west of Aiken Lake area, but numerous stocks and tongues are known to occur within the defined area. Some of the stocks are large, and probably the large intrusive bodies of Thane and Porphyry Creeks are marginal phases of the batholith. Phases of batholithic rock observed in decreasing order of abundance were, diorite, syenite, granodiorite, and quartz-diorite chiefly. A large stock of coarsely-crystalline syenite is crossed by the southern branch of Big Creek, and many of the smaller intrusive bodies consist of syenite.

Within the area examined, the rock exposed in the western part is chiefly a massive, metamorphosed greenstone, presumably an andesitic flow-rock. This is somewhat similar lithologically to the volcanic flow-rocks of the Manson Creek area (described in Annual Report, Minister of Mines, British Columbia, 1938), although only locally does it exhibit the same degree of hydrothermal alteration. This belt is considered by the Geological Survey of Canada to be of Carboniferous age. In a glacial cirque, on the Granite Basin group, this greenstone is intercalated with non-schistose sediments, quartzites, and argillites, the strike varying from north 27 degrees west to north 33 degrees east, the dip being about 45

degrees southward. In the Manson Creek area, sediments intercalated with volcanic flow-rocks of Carboniferous age are schistose.

Within the area chiefly underlain by this greenstone are smaller areas underlain by andesitic flow-rocks and intercalated sediments that do not exhibit the same degree of metamorphism, and are presumably younger.

Near Uslika Lake, close to the left bank of the Osilinka River, are several exposures of bedded conglomerate, which must represent a former drainage system. The conglomerate is exposed over a height of 75 feet and a length of 255 feet on a small creek flowing south-eastward into the Osilinka River one-quarter of a mile above Uslika Lake and for about three-quarters of a mile almost continuously on Big Creek, as shown on Fig. 1. On Vega Creek this formation is cut near the mouth of the creek, and a large knoll on the north of the creek is composed almost wholly of conglomerate. Interstratified with the conglomerate beds, are beds of fine-grained sandstone. The strike varies from due north to north 70 degrees west and the dip from 25 degrees southward to nearly vertical. At some points the beds are faulted, but dislocation is only a few feet. Slickensiding is well-developed along fault-planes, but the formation is not schistose. The constituent pebbles of the conglomerate range in size from the diameter of a pea up to about 9 inches, and consist of greenstone, batholithic rock and quartz. As all other observed formations mentioned in the preceding paragraphs are intruded by the batholithic rocks, whereas no intrusive bodies were seen in the conglomerate, it is possible that the latter may be correlated with the Cretaceous conglomerate exposed on Takla Lake. In the absence of further field-work, however, any definite conclusion on this point is not justified.

Bordering the greenstone on the east are non-micaceous sediments, argillite and quartzite, with some limestone beds, mainly schistose, which are likely of Palaeozoic age. These are well exposed in Goat Creek Canyon for a distance of about 1 1/2 miles above the mouth of the creek. They strike about north 24 degrees west and dip to the north-east between 50 and 70 degrees.

Adjoining these rocks on the east is a belt of micaceous sediments well exposed on Jimmay Creek about 1 1/2 miles above its mouth, in a gorge at the head of which a deposit of placer was originally discovered by James May in 1899. The sediments are quartz-mica and quartz-sericite schists; they strike north 19 degrees west and dip about 50 degrees to the south-west. In them are a number of small, unmineralized quartz veins up

to 1.5 feet in width, which follow the planes of schistosity of the host-rocks. About three-quarters of a mile above the gorge on Jimmay Creek, the schists are intruded by a small stock of granitic rock, which is exposed in the bed of the creek for a distance of 150 feet. These schists are lithologically similar to and likely to be the same age as those which outcrop on the Osilinka River near its mouth, and are considered by the Geological Survey of Canada to be of Precambrian age.

Mineral Deposits.

It will be clear from the described geology that the region is within the aureole of a batholith, and as such merits prospecting, nevertheless it is well to bear in mind that although recent road construction has greatly improved transportation, the distance from Vanderhoof, the nearest railway point, to Aiken Lake is 277 miles. In such a case it must be apparent that any mineral showings, if they are to possess commercial attractions, must be comparatively large, if low grade, or high grade, if small, to offset higher costs of mining and transportation in such a region. It is, therefore, essential that outcrops of mineral deposits, and the surrounding region be most carefully examined, and every effort made to appraise their commercial significance before more than even a small amount of surface work is undertaken.

Although the likelihood of many pre-existent placer deposits surviving the severe glaciation apparent in the area, is considered small, a post-Glacial placer deposit may be taken as some evidence of gold-bearing rocks in its vicinity, although it does not follow that a commercial lode-gold deposit will be found. For this reason, the placer found on Jimmay Creek seems to justify some search in the vicinity for gold-bearing quartz veins, especially as quartz veins are exposed in the creek's valley. Similarly, although McConnell Creek is outside the Aiken Lake area, the post-Glacial placer deposits thereon justify some search in the nearby region for lode-gold deposits. It may also be noted that the discoveries of the Ferguson and Childhood's Dream, both silver-lead-zinc deposits, also outside the Aiken Lake area, possibly indicate that this type of deposit may occur in the limestone bordering the Precambrian rocks on the west.

As the south-eastward continuation of the Eastern batholith is now made accessible by the completion of the Fort St. James-Manson Creek motor-road, prospecting seems logical in the region of the aureole of the batholith north-west and

south-east of Mount Milligan. The growing importance of deposits of molybdenum and tungsten, apart from their present demand for war purposes, may well be borne in mind.

Lode.

All the properties described below are in or near an intrusive body, and are owned by the Consolidated Mining and Smelting Company of Canada, Limited, and may be classified as follows:

Lode-gold Deposits: Granite Basin: Jupiter (one vein system); Pluto and Polaris.

Gold-copper Deposits: Croydon and Vega.

Silver-lead-zinc Deposits: Jupiter (one vein-system).

Copper Deposits: Thane.

No operations were in progress at any of these properties at the time of the present examination, nor did any member of the company's staff accompany the Mining Engineer; assay plans were, however, supplied by the company.

Original open-cuts and surface-strippings have sloughed badly since the commencement of operations, consequently all surface exposures were either partly obscured, or completely covered at the time of this examination.

No detailed sampling was undertaken, and the results of samples taken are cited merely to indicate values found at any particular point.

CROYDON. This property consists of twenty mineral claims on the adjoining Croydon and Porphyry Creeks, two approximately parallel southward-flowing tributaries of Miller Creek.

The property is reached by a pack-trail 9 miles in length from the west end of Aiken Lake. This latter point is indicated by a Mile-post as being 86 1/3 miles from Old Hogem; or 97 1/3 miles from Germansen Landing. A winter road deviating but slightly from the pack-trail has been cleared but not graded from the west end of the lake to the property. Both trail and road lead to the site of the former camp buildings, on Croydon Creek, approximately midway between points of activity on Croydon and Porphyry Creeks. The grade is good, the total rise being only about 400 feet. All camp buildings and

surrounding timber, over an area of several square miles, were destroyed by a bush-fire in 1938, although the latter did not reach the mine workings.

Porphyry Creek, Croydon Creek, and a tributary of the latter, head in glacial cirques in rugged regions. All important mineral showings and underground workings are situated at the lower ends of the creeks, only a short distance above the points at which they enter the wide valley of Miller Creek. The workings are from 250 feet to 300 feet above the camp-site from which they are readily reached by branch trails about three-quarters of a mile and half a mile in length to Porphyry and Croydon Creeks respectively. The region before it was burnt in 1938, was covered with dense timber-growth and vegetation up to an elevation of about 4,800 feet.

The top of the mountain-shoulder between Porphyry and Croydon Creeks at the mine workings, is only about 120 feet above the creeks, and is rounded. Its height above the creeks gradually increases up-stream, its summit becomes less rounded, and it finally merges in a sharp ridge at elevation 6,700 feet, at the head of the adjoining cliff-walled cirques in which these creeks rise.

An area of about 3 square miles, surrounding Porphyry and Croydon Creeks, extending from the former to about 1 mile east of the latter, is underlain by hornblende-diorite, save for a few small outcrops of greenstone which may be remnants of roof-rocks or in some cases perhaps large inclusions. On the mountain east of Croydon Creek the hornblende-diorite contains many xenoliths of pegmatitic diorite, and locally the development of epidote is intense. West of Porphyry Creek, the hornblende-diorite is intruded by a stock of granodiorite locally pyritized. Evidently, there were different periods of batholithic intrusion. About one mile east of Croydon Creek, metamorphosed greenstones are exposed. Time did not permit an examination of the region west of Porphyry Creek, consequently it is not known if this intrusive body is a large stock of the Eastern batholith, or the eastern margin of the latter. It is, however, evident from the position of the eastern flank a few miles to the south as determined by Dolmage, that this intrusive body is probably a marginal phase of the Eastern batholith.

Quartz veins with free walls occur in shear-zones in hornblende-diorite. A number of shear-zones varying in width from a few inches to 20 feet in one instance, have been discovered in the region, but attention has centered on those cut by the lower parts of Porphyry and Croydon Creeks, and chiefly

on the latter, which have been followed by all important underground workings. In the region of the latter, five approximately parallel shear-zones occur within a belt about 200 feet in width. They strike about north 13 degrees east and dip to the south-east at angles of between 64 and 85 degrees. The quartz veins conform in strike and dip with the containing shear-zones, and due to post-mineral movement, both vein-walls are free. Much crushing of hornblende-diorite, attended by chemical alteration of this rock, is evident within the zones of shearing. Some veins are lenticular, but it has been proved that the length of the most important (named by the company No. 12 vein), exceeds 75 feet, the average width being between 4 and 5 feet for this distance. An open-cut now badly sloughed proves that the exposed length of mineralized quartz exceeds this, possibly by 50 feet, and it is understood that a greater width than that mentioned was exposed in this open-cut. An exposure on Porphyry Creek indicates that one vein in that region may approach 20 feet in width. The veins exposed on Croydon Creek are mineralized chiefly with pyrite and chalcopyrite. In some sections mineralization is abundant. Subordinate amounts of molybdenite, magnetite, and feldspar were also observed. It is evident therefore that high temperature conditions prevailed at the time of deposition. Chalcopyrite was also observed in some of the smaller veins on Porphyry Creek, but not in the large vein under investigation, which is mineralized with pyrite, and molybdenite.

Surface Workings on Croydon Creek. These, all badly sloughed at the time of examination, consists of open-cuts and trenches. The largest and most important is an open-cut on vein No. 12, which is understood to have exposed originally the full width of this vein for a length of 50 feet along its strike. Owing to sloughing all that can now be discerned is a width of 2.5 feet of quartz, heavily mineralized with pyrite, extending for a length of 15 feet. It is, however, clear, from underground workings chiefly, that on the right or west bank of Croydon Creek, where rock is obscured by a thin veneer of unconsolidated material, a group of veins of the type described is exposed. These are more or less parallel, strike about north 13 degrees east, and dip to the south-east at angles of between 64 and 85 degrees. Five occur within a belt about 200 feet in width, and a sixth, 375 feet farther west, measured in a direction at right angles to the strike, was originally exposed, it is stated, in a trench which has now completely caved. The company's names of these veins, in order from east to west, are Nos. 13, 12, 14, 10 and another unnamed. The sixth vein is No. 8. Veins Nos. 12 and 13 are adjacent in a zone of shearing about 18 feet in width, and may well be regarded as lenses on the foot- and hanging-wall

of the same shear-zone. Vein No. 12 is by far the stronger, is exposed continuously underground for a distance of 75 feet, and is between 4 and 5 feet wide for this distance. Its total length exceeds 75 feet because the southern end of the large open-cut mentioned above, which is within a few feet both horizontally and vertically of this underground working, exposes the vein.

Underground Workings on Croydon Creek. An adit-crosscut known as "Main West Adit" was driven to intersect the south-eastward continuation of the vein exposed by the large open-cut. This working cut the shear-zone containing both No. 12 and 13 veins close to the southern end of the former vein, and also cut another weaker shear farther west, possibly the south-east continuation of vein No. 10. The northward drive from the adit on vein No. 12 (39-12 drift) exposed a width of 4 feet of quartz, a few feet from the point of commencement, for a length of 75 feet. This quartz was well mineralized with pyrite and a lesser amount of chalcopyrite and varying from 4 to 5 feet in width, was continuous to the face. A sample across 4 feet at the face assayed: Gold, 0.4 oz. per ton; copper, 0.9 per cent. Another sample taken at a point 57 feet south of the face, across 4 feet, assayed: Gold, 0.06 oz. per ton; copper, 0.4 per cent. Two crosscuts were run east from 39-12 drift as shown on Fig. 2. The more southerly of these indicated a total width of 18.1 feet of sheared ground which contains veins Nos. 12 and 13. The latter at this point occurs on the hanging-wall and consists of a width of 5 feet of sparsely-mineralized quartz, separated by barren sheared material from vein No. 12. The more northerly cross-cut shows that the total width of vein No. 12 is 10.5 feet at the point of cross-cutting separated by a band of bleached and sheared material 5.5 feet in width from vein No. 13, which consists of sparsely-mineralized quartz 3.4 feet in width. Both walls of the described veins are free, and have gouge along them. The second drift north from the Main West Adit follows a well-defined shear-zone which contains a narrow band of sparsely-mineralized quartz a few inches in width. This may be the south-east continuation of vein No. 10.

The drive south from the Main West Adit following vein No. 13, known as 39-12 drift, is timbered for the first 35 feet of its length and is, apparently, driven on the west side of vein No. 13 which is exposed, by a short crosscut east, as a quartz vein 2.4 feet in width sparsely mineralized with pyrite. A crosscut west, 15 feet in length at this point, discloses a strongly defined shear-zone containing but little quartz. South of this point, vein No. 13, exposed continuously for 35 feet up to the second point of crosscutting

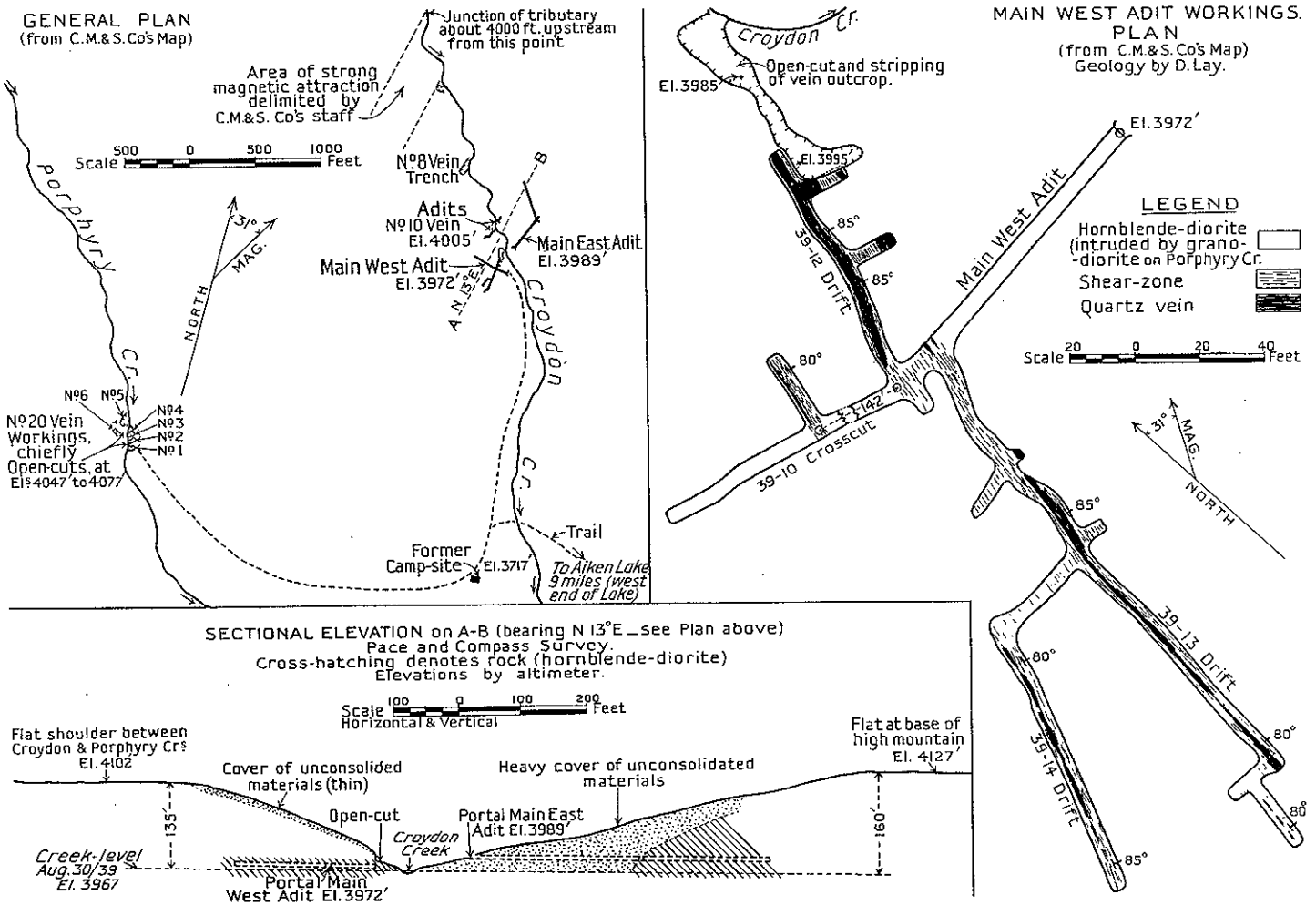

Fig. 2.
Croydon Group.

(east and west) varying from 2 to 4 feet in width, is composed of quartz sparsely mineralized with pyrite. Thereafter it pinches and swells to a maximum width of 2 feet. At a point 25 feet north of the face, it widens and the face exposes 3 feet of mineralized quartz with some quartz stringers throughout the remaining filling. Crosscutting to the west at the face shows strongly-sheared ground containing quartz lenses. This ground was followed for a distance of 20 feet farther southward. The second crosscut west from 39-13 drift passes through sheared ground finally encountering vein No. 14, which was subsequently followed a distance of 85 feet. This vein is lenticular and sparsely mineralized with pyrite and varies in width from 1 foot to somewhat over 3 feet. It is understood that assays taken by the company did not indicate encouraging gold values. The face shows some quartz stringers only a few inches wide.

To expose the north-eastward continuation of veins Nos. 12 and 13 on the left or east bank of Croydon Creek the Main East Adit was driven at elevation 3989 feet on a bearing north 25 degrees east a distance of 300 feet before reaching rock, the cover of unconsolidated materials being heavy on that side of the creek. When the adit reached rock, the edge of the latter was followed north-westward a distance of 285 feet. These workings are tightly lagged, and little information can now be gained from this drift. It is understood however, that mineralized float was discovered in this working, and also that some evidence was obtained of the shear-zone containing veins Nos. 12 and 13.

An adit 45 feet in length driven on a bearing south 21 degrees west at elevation 4005 feet, follows a shear-zone in diorite 5 feet in width. The width of the quartz vein therein, (vein No. 10), is not exposed as the back is tightly lagged. The face of the adit shows a small quartz stringer mineralized with pyrite. A crosscut was run at the face of this adit for a distance of 25 feet on a bearing north 67 degrees west. At a distance of 12 feet from the adit, a shear-zone striking diagonally across the working, and dipping southward at 37 degrees, was penetrated. The total width of this is 5 feet of which 18 inches is a quartz vein heavily mineralized with pyrite, some chalcopyrite and molybdenite. A sample of this quartz-vein across a width of 18 inches assayed: Gold, 0.14 oz. per ton; copper, 0.8 per cent. This shear-zone intersects another within a distance of a few feet. The latter bends near the intersection and, in the drift which follows it south-westerly for a distance of 30 feet, its strike is south 35 degrees west and its dip 64 degrees south-eastward. It has a maximum width of 5 feet and contains

a quartz vein 4 feet wide, heavily mineralized with pyrite and some chalcopyrite near the point of intersection with the former. A sample taken across 4 feet at this point assayed: Gold, 0.10 oz. per ton; copper, 1.4 per cent. South-west of the intersection, at a point 12 feet from the face, the quartz vein narrows to 8 inches. At the face no quartz is apparent.

Surface Workings on Porphyry Creek. On Porphyry Creek between elevations 4,047 feet and 4,077 feet, at the mouth of a gorge, open-cuts on both banks distributed over a length of 260 feet adjacent to the creek reveal large exposures of quartz. The quartz is locally well mineralized with pyrite, and noteworthy amounts of molybdenite, but the average sulphide content is low. The creek flows over hornblende-diorite, but a few feet away from the creek on both banks, rock is obscured by several feet of glacial debris.

Four open-cuts numbered 1 to 4 on Fig. 2 are situated on the east bank of the creek.

No. 1. The most southerly cut is sloughed completely.

No. 2. A cut 60 feet up-stream from No. 1 is 45 feet long, 10 feet deep and 15 feet wide, and has also sloughed but exposes hornblende-diorite in the part adjacent to the creek.

No. 3. A cut 50 feet up-stream from No. 2, is 45 feet long, 12 feet deep, 15 feet wide, and exposes adjacent to the creek hornblende-diorite in which is a body of quartz 20 feet long and 5 feet wide, the attitude of which is not revealed. The quartz is sparsely mineralized with pyrite.

No. 4. A cut 6 feet up-stream from No. 3 is 10 feet deep, 18 feet long, 30 feet wide, and exposes a body of quartz 30 feet long and between 10 and 12 feet wide.

This exposure indicates a large quartz vein striking north 18 degrees east, and dipping 15 degrees south-eastward. The quartz is locally well-mineralized with pyrite and noteworthy amounts of molybdenite. A sample taken of the best mineralization assayed: Gold, nil. On the right bank of the creek, distant 60 feet up-stream from the last described open-cut, hornblende-diorite rises sharply to a height of 35 feet above the creek and forms a more or less flat bench which is heavily overlain by glacial drift at down-stream points. An open-cut No. 5 (Fig. 2) immediately adjacent to the rock mentioned, re-

veals a bluff-like exposure of a large body of quartz. The area of the face of this exposure is 55 feet by 25 feet, and the area of the largest exposure of quartz is about 30 feet by 10 feet. Hornblende-diorite is also exposed at the down-stream end of the open-cut at, and for a few feet above creek-level; the two exposures of rock being about 60 feet apart. It is clear that this is an exposure of a large vein contained in a shear-zone in hornblende-diorite, the hanging-wall of the latter being exposed at the up-stream end of the open-cut, but the foot-wall is not revealed. The strike is apparently north 51 degrees east, and the dip is 20 degrees north-westward. In the central and down-stream parts of this open-cut the quartz is directly overlain by glacial debris and the top section of the vein has evidently been eroded. An adit has been run a few feet immediately below the top of the quartz, which is sparsely mineralized with pyrite.

A sample taken at the face of this adit, across 7 feet, assayed: Gold, nil; copper, nil. At the level of the top of this open-cut, at a point 50 feet west of the latter an adit, now caved, has apparently been run a short, but indeterminate distance in gravel. From the above open-cut, 55 feet down-stream, another open-cut, No. 6 (Fig. 2), 50 feet long, 10 feet wide, 12 feet deep, is now much sloughed and reveals but little beyond the fact that it exposed hornblende-diorite for the first few feet of its length.

The quartz revealed by the open-cuts on opposite sides of the creek may be exposures of two large adjacent veins, or they may exemplify exposures of one and the same vein; the dissimilar strikes being explained by warping. Further work is necessary to determine this point.

GRANITE BASIN — This group of 8 mineral claims is in a glacial cirque at the head of a small tributary of a large creek flowing south-eastward into Canyon Creek.

The property is reached by a pack-trail about 6 miles in length, which leaves the winter road close to Mile-post 84, near the north shore of Aiken Lake. The trail ascends a defile to the wide valley at elevation 3930 feet in the central part of which Canyon Creek flows in a canyon. The trail then swings north-westward up the valley, on an easy grade, to the camp buildings at elevation 4540 feet on the lower slopes of the mountain range, which forms the southern rim of the valley. The camp buildings are on the south side of a small creek, which drains a north-eastward-trending glacial cirque at its head. This cirque, although not draining directly into Canyon

Creek is one of the large number incised in the mountain range mentioned. A branch trail leads to a summer camp-site at elevation 5,000 feet on the northern side of the lower end of the cirque.

Underground workings and surface showings lie between elevations 5,105 feet and 5,865 feet on the treeless southern wall of the cirque, which is steep and in places precipitous. They are reached by a foot-trail somewhat over half a mile in length, which zig-zags up the basin wall. The length of the cirque which is cliff-walled near its head is about half a mile, and the elevation at the head is 6,880 feet.

The formations in which the cirque is incised are well revealed, but access to many points cannot be gained owing to the cliff-like nature of exposures. Intercalated greenstones and non-schistose sediments, chiefly argillite and quartzite, striking from north 27 degrees west to north 33 degrees east, dipping southward at about 45 degrees, are intruded at all points of the basin by large igneous tongues or by either dykes or sills. The southern wall at the lower end of the basin is composed mainly of greenstone, intruded by igneous tongues. The sediments are confined to the central and upper parts of the basin and the northern wall.

The larger intrusive tongues are composed of porphyritic diorite containing large crystals of feldspar; or of porphyritic diorite containing large crystals of hornblende; or of porphyritic quartz-diorite containing phenocrysts of feldspar and quartz. The porphyritic diorite tongues of which several are exposed at the lower end of the south wall of the cirque have an easterly trend, and are well mineralized with pyrite, which is auriferous near the workings. The greenstone near the contacts is also pyritized. Hybridization is very marked, and there is no line of demarcation between intrusive and greenstone, the former gradually merging in the latter through hybridized types. At some points there is shearing near the intrusive body.

At elevation 4,765 feet, just below the outlet where the creek drains the cirque, diorite is exposed for 225 feet. Therefore it seems likely that the numerous intrusive bodies are apophyses of a stock of which the diorite cut by the creek is a part. If this is the case the remaining cover-rocks must be comparatively thin.

The mineral occurrence which engages the company's attention is auriferous pyritization in the intrusive tongues and in the adjacent hybridized rock.

Surface Workings. The Company, it is understood, were originally able to distinguish five zones of pyritization, along which a large number of open-cuts were made, and all of which were systematically sampled. These open-cuts are now, however, greatly obscured and some almost entirely obliterated by the constant accumulation of talus on the steep slopes of the wall of the cirque. The dislodged fragments of rock from higher parts find a lodgment in the open-cuts. Three zones of pyritization are, however, now recognizable. The five zones cover a horizontal range of about 1,400 feet and a vertical range of some hundreds of feet at the lower end of the southern wall of the cirque and are numbered by the company from Nos. 1 to 5, No. 1 zone being the most northerly. As there are no definite boundaries to these pyritized zones it is impossible to assign definite widths. However, the lengths of open-cuts or trenches at right angles to the strike of these zones range from 15 to 75 feet which may be taken as an approximate gauge of the widths. The open-cuts are distributed at various elevations along the approximate strike of the zones, for lengths from 165 feet to 450 feet. Samples taken by the company of 5-foot sections of these zones range from a trace to 0.52 oz. gold per ton.

Underground Workings. These are confined to zone No. 1. The open-cuts on this zone lie between elevations 5,290 and 5,510 feet on the southern wall of the glacial cirque. At elevation 5,245 feet an adit is run for 35 feet on a bearing south 11 degrees east, thereafter on a bearing south 13 degrees west. At points 63 feet and 98 feet from the portal, cross-drives have been run for 65 feet and 10 feet respectively. The bearing of each is south 53 degrees east. A shear-plane striking north 67 degrees west, dipping south-westward at 60 degrees is exposed in the more southerly of the cross-drives, and also in the main adit. The above workings are wholly in rock. The rock exposed in the main adit north of the shear-plane is porphyritic diorite, that exposed south of the shear-plane mentioned more nearly resembles greenstone. Samples taken by the company in this last-mentioned region of the adit assayed a trace of gold. A sample of chippings from both walls of the first 40 feet of the more northerly of the cross-drives assayed: Gold, 0.2 oz. per ton. Another sample composed of chippings of the walls of the main adit between the two cross-drives assayed: Gold, 0.06 oz. per ton. At a point 140 feet below this adit, distant 102 feet on a bearing north 11 degrees east, another adit is run at elevation 5,105 feet, for a distance of 104 feet in talus on a bearing south 9 degrees east. At this point the adit enters solid rock in which it continues a further 25 feet to the face on a bearing due south. The rock penetrated by this adit

closely resembles the porphyritic diorite found in the upper adit north of the shear-plane. It is pyritized but not to the same extent as the rock in the upper adit. It is apparent that mining operations would require to be controlled largely by sampling.

JUPITER

This property consists of 14 mineral claims situated on Canyon Creek. The camp buildings and all surface and underground workings are on the north side of the creek near the junction of Canyon Creek and a tributary locally named Berry Creek. The property is reached by a pack-trail, which branches from the one to the Granite Basin (previously described), at a point 3 miles north of Aiken Lake. This trail follows northward on the wide floor of Canyon Creek Valley to the edge of the deep canyon in which this creek flows, and switchbacks down and up the canyon walls. Canyon Creek, which is wide at this point, is crossed by a foot-bridge, but horses must ford the creek. The walls of the canyon are 375 feet in height, and the camp buildings are on a bench 90 feet below the top of the north wall of the canyon. The total distance from Aiken Lake is about 4 1/2 miles.

In this region the central part of a wide flat-bottomed valley has been incised by Canyon Creek to form a rock-walled canyon approaching 400 feet in depth. The valley is well timbered, and about 3 miles in width. Its floor is but thinly covered with unconsolidated material, as many large rock-exposures only a few feet in height emerge from the vegetation at different points. A southward-flowing tributary of Canyon Creek, known locally as Berry Creek, has deeply incised its bed in the north wall of the canyon, and all surface and underground workings are near this point.

The formation exposed near the workings is andesitic greenstone, intruded by a small fine-grained dioritic dyke. The greenstone is traversed by two faults, one of which is traceable on the surface for 230 feet, strikes almost due north, and dips westward at about 50 to 59 degrees, and is known as fault "B." Terminated abruptly by this fault is another known as fault "A," traceable only for about 20 feet on the surface, it strikes north 53 degrees west, and dips 80 degrees southwestward.

There are two types of mineral occurrence:-

(a) A brecciated vein striking north and dipping west, filled with quartz-calcite and fragments of host-rock, and mineralized with auriferous pyrite, contained in fault "B,"

also known as "No. 2" vein. A feature of this fault-zone is the deposition of graphite, which is particularly abundant at some points. The maximum observed width of the vein was 4 feet, but at many points the width is only a few inches. The structure of this vein at many points is that of a fault-zone healed with quartz-calcite. The pyrite not only occurs in the latter, but also as a replacement in brecciated fragments of andesitic greenstone, proving that mineralization post-dated the first movement. It is also evident that subsequent to mineralization, further movement took place, which produced many individual lenses characteristic of "drag" material. Quite likely graphite was deposited at this stage. The fault "B" is exposed on the surface by stripping for a distance of 230 feet along its strike, but owing to sloughing, the described mineralization can now only be perceived in the underground workings.

(b) Quartz-calcite veins contained in shear-zones striking either north-west or north-east and mineralized with galena, sphalerite, tetrahedrite and some pyrite. The chief constituent value of these is silver. Veins of this type where exposed on the surface vary in width from 20 inches to 2.5 feet, but underground exposures of veins of this type are only a few inches wide, and with one exception discontinuous. Walls of both types of veins are free owing to post-mineral movement.

Surface Workings. Originally the steep 40-degree valley-slopes of Berry Creek were stripped by hydraulicking in the regions, shown on Fig. 3, adjacent to the underground workings. Sloughing has doubtless obscured much that could originally be perceived. On the west bank of Berry Creek, andesitic greenstone is exposed over an area about 240 feet in length by 140 feet in width. The southern part of fault "B" is clearly exposed for a length of 114 feet striking more or less directly across the steep rock-exposure on the west bank of Berry Creek as far as its intersection with "A" fault at elevation 3,675 feet. Its continuation for another 120 feet northward can be seen. The southern part of this fault-zone is several feet in width, and is featured by development of much graphite, both in this region and in the underground workings. The northern continuation of this fault-zone is only a few inches wide. The mineralization described is contained in what is apparently the downward continuation of this fault-zone, but cannot now be seen in the surface exposure. Fault "A" is exposed for only about 20 feet along its strike. The attitudes of these faults have been previously described. In a direction north 73 degrees west from the

fault-intersection at elevation 3,725 feet, near the top of the stripping, a quartz-calcite vein 20 inches wide strikes north 88 degrees east, dips 85 degrees north-westward, and is exposed for a total distance of 33 feet along its strike.

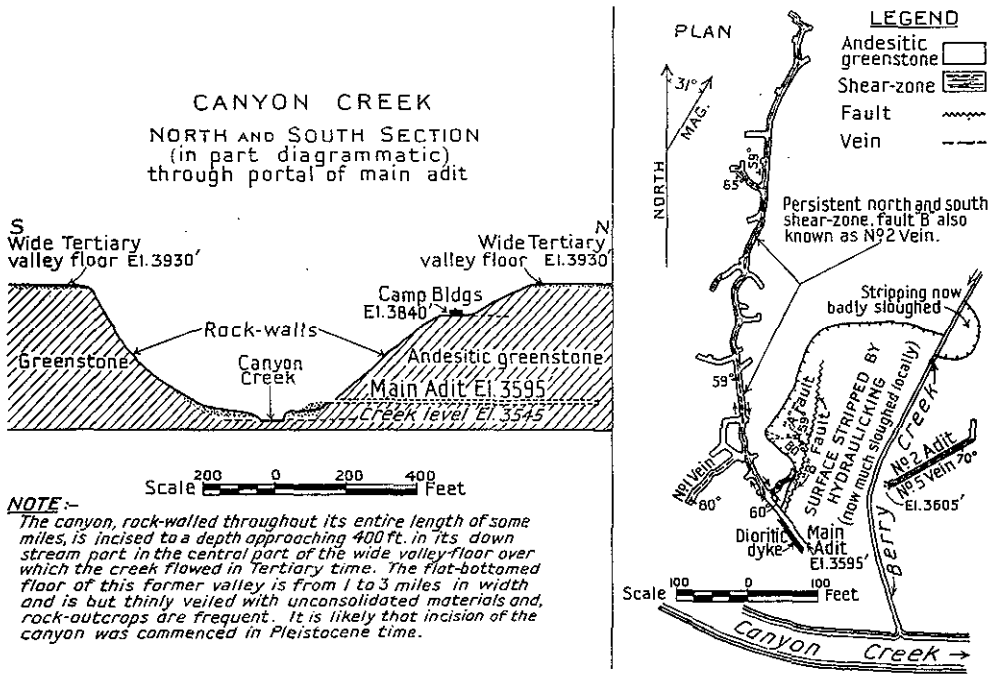

Fig. 3.
Jupiter Group.

This vein, is terminated by "A" fault and bent south-east by it, and is sparsely mineralized with galena, sphalerite and pyrite. A sample across 18 inches of the best mineralization assayed: Gold, trace; silver, 5.4 oz. per ton. Another quartz-calcite vein 2 feet in width, striking north 56 degrees west, with a vertical dip, branches from this vein. It is well-mineralized with galena, sphalerite and tetrahedrite, and stained with azurite and malachite. Sample across 18 inches of the best mineralization assayed: Gold, 0.02 oz. per ton; silver 77.6 oz. per ton; copper, 0.3 per cent. This vein, exposed for a length of 25 feet along its strike, apexes at elevation 3,745 feet. At the south-western extremity of the surface-stripping near the main adit, a small dioritic dyke 3 feet in width is exposed, for a length of 35 feet along its strike, up to fault "B." The stripping is not sufficiently extensive to determine the age of this fault in relation to the dyke.

On the opposite bank of Berry Creek an area originally stripped has now sloughed completely and obscured the exposures. On this side of the creek exposed largely by natural agencies for a few feet along its strike, immediately above No. 2 adit, is a quartz-calcite vein 2.5 feet wide sparsely mineralized with galena, sphalerite and pyrite, somewhat stained with malachite.

Underground Workings. Attention has been mainly directed to the region on the west bank of Berry Creek. The main adit is run at elevation 3,595 feet, 50 feet above the level of Canyon Creek at the south-western extremity of the surface stripping, and just east of the small dioritic dyke. For the first 90 feet of its length, this adit is driven north 38 degrees west at which point it encountered a northward-striking fault-zone dipping from 50 to 59 degrees west, presumably the downward continuation of fault "B," which was thereafter followed for a total distance of 700 feet by the main adit, and comparatively short drives were run, as shown on Fig. 3, on numerous intersecting shear-zones. Noteworthy mineralization was first encountered in this fault-zone at 170 feet from the portal and was thereafter continuous for about 100 feet. For the next 210 feet the drive shows but little mineralization. An improvement in size of lenses and mineralization then took place, but for the remaining distance the vein is lensy, discontinuous and, poorly mineralized. This vein has been previously described, but it might be added that in the best mineralized part of the vein, assays of samples taken by the company across widths from 2 inches to 12 inches range from gold 0.31 to 7.18 oz. per ton. Of the intersecting shears, two, known as No. 3 vein and No. 1 vein, of type (b), are noteworthy. No. 3 vein, encountered 90 feet from the portal of the adit, was followed north-eastward from the adit for a distance of 60 feet. Its dip is 60 degrees to the south-east. It consists of discontinuous quartz-calcite lenses about 9 inches in width well-mineralized with galena, sphalerite, and tetrahedrite. It is suggestive of a once continuous vein, which, after mineralization, has assumed a lenticular character owing to movement. Much calcite is developed in the greenstone filling in the zone of shearing. The face shows a narrow quartz-calcite lens, and does not look promising. Piled in an adjacent working is about 2 tons of hand-picked ore, mined from this drive. A grab sample of this assayed: Gold, 0.02 oz. per ton; silver, 152.0 oz. per ton; copper, 1.3 per cent; lead, 7.5 per cent; zinc, 11.7 per cent, which well represents the character of the mineralization. No. 1 vein was encountered 165 feet from the portal of the adit and was followed south-westward from the adit for a distance of 105 feet. It is a small quartz-calcite vein of a maximum width of 10

inches, although the average width is less. It is the most continuous of those observed at this property, and extends for practically the full length of the drive. Its width at the face is 6 inches. About 5 tons of hand-picked ore which is piled at the entrance of the drift was obtained from this drive. A grab sample of this assayed: Gold, 0.02 oz., per ton; silver, 76.3 oz. per ton; copper, 0.6 per cent; lead, 0.4 per cent; zinc, 8.8 per cent. The mineralization is very similar to that in No. 3 vein, and in other veins exposed on the surface namely, a mixture of galena, sphalerite and tetrahedrite, with some pyrite. Mineralization is fairly continuous throughout the drift, and a sample taken at the face across 6 inches assayed: Gold, trace; silver, 16.6 oz. per ton.

There is marked evidence that the southern end of No. 3 vein has been bent north, and at a point 90 feet north of this in the main adit, a small north-eastward striking vein is also bent north. This suggests that No. 1 vein may be the dislocated part of No. 3 vein, and that the once continuous vein was faulted by "B" fault (see Fig. 3). It is understood that originally there was evidence that the small dioritic dyke previously mentioned as being exposed at the portal of the main adit, and on the surface, above the latter, was penetrated by the adit close to the south-western end of No. 3 vein. However this is not clear now.

A feature of fault "B" is the presence of graphite on the planes of shearing. This mineral is abundant at some points in the main adit. Graphite is also present in a shear-zone in volcanic flow-rocks at the Pluto (subsequently described). In these and other instances observed in other regions, it is difficult to account for the presence of this mineral other than as originating from magmatic emanations as described by Lindgren in "Mineral Deposits," Fourth Edition, page 730.

Adit No. 2 is driven at elevation, 3,605 feet for 140 feet on a bearing of north 61 degrees east, and thence for 24 feet on a bearing north 31 degrees east. It follows, from the portal, the downward continuation of the vein previously described as outcropping immediately above the adit. The adit is closely lagged in the sheared ground for the first 35 feet of its length. For the next few feet the back exposes a maximum width of 3.5 feet in which are crushed quartz-calcite lenses. Thereafter, the sheared region exhibits individual lenses of this character 2 to 3 inches in width; mineralization is sparse.

POLARIS

This property, consisting of 8 mineral claims on a large southward-flowing tribu-

tary of Canyon Creek, locally and aptly named Goat Creek, is reached by a pack-trail about 2 1/2 miles in length from the Jupiter. This trail ascends on good grade the short slope from the latter property to the wide floor of Canyon Creek Valley, which is subsequently followed to a point on Goat Creek about 1 mile above its mouth where the creek may be forded, and where the trail ends. Except for the first few hundred yards of its length the trail is practically level.

For a length of about 1 mile above its mouth, Goat Creek cascades through a steep-walled rock-gorge, which becomes progressively more canyon-like and deeper down-stream until at its junction with Canyon Creek, its depth approaches 300 feet. The junction of these two large gorges is a striking topographic and scenic feature. The terrain above the canyon is covered with heavy timber-growth.

No permanent camp was erected by the company at this property as the operations undertaken did not necessitate one. The temporary camp is on the east side of the creek at the top of the gorge about three-quarters of a mile above the mouth of the creek.

The formation consists of interstratified argillite, quartzite, and limestone, and is well exposed by the deep gorge mentioned, which cannot, however, be traversed throughout owing to falls. The sediments have an average strike of north 24 degrees west, a dip from 50 to 70 degrees to the north-east, and are mostly schistose. They are intruded by a stock of porphyritic diorite at a point about three-quarters of a mile above the mouth of the canyon; and by a larger stock of fine-grained acid intrusive about 750 feet farther up-stream.

The types of mineral occurrence which engaged the company's attention are:

(a) A ramification of small intersecting quartz veins from 2 to 3 inches in width occurring in argillite within an exposed area of about 120 feet by 40 feet. It is understood good gold values were found in the veins.

(b) Mineralization of replacement type consisting of pyrite and pyrrhotite, exposed at two widely-separated points at one of which chalcopyrite is also present. In addition to these at one point on the steep inaccessible eastern wall of Goat Creek gorge, some adjacent quartz veins, apparently not over 1 foot in width, appear to follow the bedding planes of the enclosing argillite.

Type (a): These veins were originally exposed, it is understood, by stripping on the left bank of Goat Creek at the upper end of the gorge near the stock of acid intrusive rock, at a point about 1 mile above the mouth of the creek. Here an area 120 feet by 40 feet has been stripped, but has sloughed so that gold-bearing veins are completely obscured. At this point some intersecting quartz gash-veins from 2 to 3 inches wide are now exposed. They are mineralized with pyrite but samples of three of these assayed only a trace of gold.

Type (b): About 600 feet farther up the creek on the same bank, argillite is intruded by tongues of fine-grained acid intrusive rock and a stripped area 65 feet long and 15 feet wide near creek-level shows considerable amounts of pyrite and pyrrhotite with some chalcopyrite. This mineralization strikes north-west following the bedding planes of the host-rock, and at some points replaces the rock. The largest replacement-lens is about 9 feet long and 18 inches wide, and consists of solid sulphides. A sample of this assayed: Gold, trace; silver, trace; copper, 0.5 per cent.

At about three-eighths of a mile above the mouth of the creek there is exposed, in the bed of the creek and on both walls of the canyon, a large deposit of pyrite and pyrrhotite. Owing to the precipitous nature of the walls of the canyon, and to the fact that the creek cascades over some falls at this point, examination of only a few places is possible. It is, apparently, a replacement deposit in adjoining beds of a much fractured calcareous cherty quartzite and limestone. As nearly as can be determined it conforms closely in strike and dip with the bedding-planes of the host-rocks which strike north 24 degrees west and dip almost vertically. Its width is at least 20 feet and possibly greater. In size, it is the most impressive mineral deposit observed in the district, but, it is understood, that sampling by the company did not disclose appreciable gold values.

About three-quarters of a mile above the mouth of the creek on the east wall of the gorge, some small quartz veins about 1 foot in width are exposed in an inaccessible position. On the opposite side of the gorge a stock of porphyritic diorite is exposed. On the left bank of the creek, 40 feet above creek-level, an adit is run 60 feet north 47 degrees east, and is then deflected due north for a further 15 feet. At 46 feet from the portal a branch drive is run 44 feet north 33 degrees west, and for a further distance of 27 feet north 19 degrees east. These workings disclose nothing noteworthy.

The properties described below are contiguous to, and all reached from, Uslika Lake:

VEGA

This property, consisting of 6 mineral claims, is on a creek locally named Vega Creek, which flows into the Osilinka River about three-quarters of a mile below the northern end of Uslika Lake. It is reached by a pack-trail, about 7 miles in length, which leaves the Germansen Landing-Aiken Lake winter road immediately north of Big Creek-crossing, and follows the left bank of this creek for half a mile then ascends, on easy grade to the rolling flat-topped divide between Big and Vega Creeks. The summit at elevation 4,785 feet is about 5 miles from Uslika Lake. Thereafter the trail descends the slopes drained by Vega Creek for a further 2 miles to the camp buildings situated on a small north-flowing tributary of this creek at elevation 4,420 feet. The last 2 miles of trail pass over wet ground. A pack-trail about half a mile in length leads down the steep right bank of the tributary to the underground workings and surface showings. The latter are just above creek-level on the south side of the deeply-incised valley of Vega Creek and above the point at which the creek, after flowing south-eastward, makes a sharp bend to flow southward. All the lower mountain-slopes, are covered with heavy timber-growth and vegetation.

Near the underground workings and surface showings, the formation consists of massive basalt, which is intruded by a tongue of syenite as shown on Fig. 4. Shattered syenite detritus on the valley-slope a short distance east of the underground workings suggests that a stock of syenite is near. Minute tongues of syenite can also be perceived in the basalt underground. The neighbouring higher mountain-slopes are chiefly underlain by greenstone of presumably Palaeozoic age, but in the lower part of the valley at several points are andesitic flow-rocks markedly less metamorphosed, which are possibly of Mesozoic age. Immediately up-stream from the workings on this property the volcanic rocks exhibit intense hydrothermal alteration.

The minerals found at this property are pyrite with lesser amounts of chalcopyrite and more rarely bornite, which occur as a dissemination in the rock, and also in very small fractures within the rock. For the greater part of its length the adit follows a bearing of south 17 degrees east. Near its southern end it passed through a fault which strikes north 8 degrees east and dips 40 degrees to the south-west. This fault was also penetrated at the point shown on Fig. 4 by a cross-drive run approximately at right angles to the adit. Striae

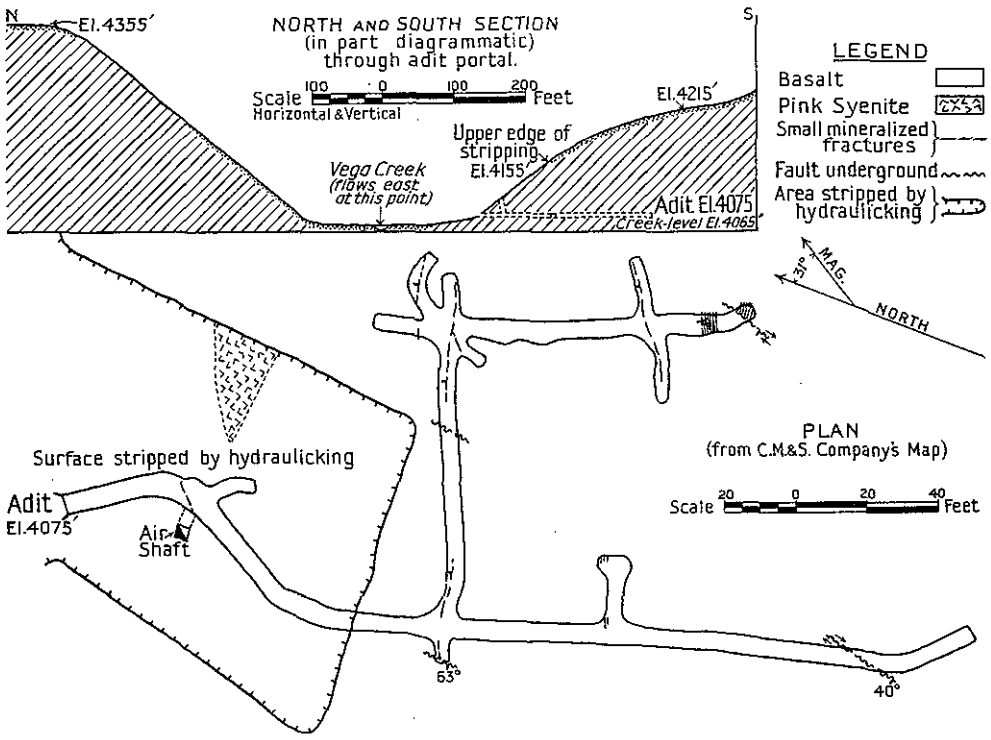

Fig. 4.
Vega Group.

indicate that the ground east of this fault has been moved southward relative to that on the west. The length of the cross-drive is 85 feet, and at the end another drive is run 20 feet northward and 90 feet southward in a direction approximately parallel to the major part of the adit. Near the end of the southward drive another fault was encountered almost parallel to the first fault described, and dipping at 70 degrees south-west. This fault evidently caused a similar relative movement of ground, but the movement did not exceed more than about 10 feet because a group of small fractures on the east side of the drive within a belt of ground 6 1/2 feet wide have been faulted 10 feet to the south. Mineralization throughout the underground workings does not appear to be abundant at any point, but is best at the point last described. It is understood, however, that a large number of samples taken by the company yielded encouraging results both in gold and copper. It is possible that the mineralization is an original constituent of basalt in part and it is also evident that another factor to be considered is the extent of the intrusive body in the region.

PLUTO This property consists of 4 mineral claims

on Pluto Creek which flows southward into a tributary of Big Creek. It is reached by a pack-trail, 5 miles in length from the Vega camp buildings, which ascends, on good grade, the southern slopes of Vega Creek Valley, crosses the latter at the 3-mile point, continues to the summit of the divide between the drainage of Vega and Big Creeks, at elevation 5,420 feet, and finally descends to the cabin on the right bank of Pluto Creek at elevation 4,900 feet.

Pluto Creek is a small stream about 1 mile in length, which is quite deeply entrenched, although rock is not exposed to any great extent near creek-level, save in the vicinity of the surface workings. The region below the cabin is covered with heavy timber and dense vegetation.

The mineralization at this property is in lenticular zones with no definite walls and consists of pyrite and arsenopyrite, within a belt of greenstone 120 feet in width. Adjacent is a small stock of porphyritic syenite of striking appearance with large phenocrysts of feldspar. Mineralization appears to follow the separation-planes between successive flows of the host-rock. Although individual zones reach a maximum width of about 15 feet, most of them are narrower, and do not extend for any great distance along the strike.

One has an observed length of 50 feet, but most of them are much narrower and shorter. They appear to occur "en echelon," and, possibly the separation-planes between successive flows of the host-rock offered channels for the mineral-bearing solutions. It is understood that samples taken by the company indicated some values in gold.

Surface Workings. There are no underground workings at this property. Near the mouth of Pluto Creek, the banks of the creek have been stripped by hydraulicking, affording one area of exposure on the north or right bank and two on the left or south bank. On the right bank, rock is exposed for a length of 225 feet and to a maximum height of 70 feet above creek-level. On the left bank of the creek directly opposite, and adjacent on the south, another area is stripped for about 110 feet long by 70 feet wide. Distant 40 feet south from the latter is another area stripped for about 50 feet by 40 feet. Distant 60 feet farther south, a trench 75 feet long and 5 feet wide and about the same depth, a few feet above creek-level, was caved at the time of examination. The greenstone at this point strikes north 10 degrees west and dips 60 degrees to the south-west, and the zones of mineralization appear to follow closely the strike and dip of the separation-

planes between successive flows of the host-rock. The widest and most continuous zone is exposed in the second-mentioned stripping. It is 50 feet long and varies from 4 to 15 feet wide, and 10 feet north of this another is from 5 to 15 feet wide and 25 feet long. Four other short zones from 1 foot to 5 feet wide are also exposed east of the first two. The third-mentioned stripping exposes one zone 40 feet long and from 2 feet to 7 feet wide. The first-mentioned stripping somewhat caved at the time of examination exposes at its eastern limit the stock of porphyritic syenite with some syenite sills in the greenstone, and down-stream from this five zones varying in width from 3 feet to 7 feet but of short length. The eastern limits of this stripping have sloughed, and all original exposures may not have been revealed at the time of examination. In this stripping, on the north side of, and adjacent to, the most easterly zone, there is exposed for a length of 20 feet a graphitic shear about 2 feet wide, with much the same strike and dip apparently as that of the greenstone. The origin of the graphite seems to be magmatic as in the case of that described at the Jupiter.

THANE

This property, consisting of 4 mineral claims, is on the upper part of Big Creek. It is reached by a pack-trail about 2 1/2 miles in length from the Pluto cabin. This trail, from the Pluto follows the left bank of Pluto Creek and the left bank of the tributary of Big Creek into which Pluto Creek flows, crosses the latter about the half-way point, and makes a switch-back descent down the steep northern slopes of Big Creek Valley on steep grades to a small meadow near the head of a canyon in which Big Creek flows. The creek is crossed by a foot-log at this point. The surface exposures and a temporary camp are situated on the opposite side of the creek at the top of the canyon-wall, a short distance down-stream at elevation 4,280 feet.

Near the surface exposures, Big Creek cascades through a canyon with vertical walls about 60 feet in height. Up-stream the topography becomes less rugged, and the canyon gives place to a gorge, which, about 1 1/2 miles above the surface workings opens out to a wide valley, in which the creek meanders. Large low-lying benches flank both its banks.

Near the surface workings the canyon exposes basic volcanic flow-rocks intruded by numerous tongues, both large and small, of pink fine-grained syenite. Up-stream the gorge exposes mainly batholithic rocks which are quite likely the eastern flank of the Eastern batholith. Coarse grained syenite is exposed in the gorge about three-quarters of a mile above

the workings.

The mineral occurrence is a sheared zone in basic volcanic flow-rocks sparsely mineralized with pyrite, chalcopyrite and magnetite. The host-rock is intruded by numerous tongues of pink fine-grained syenite.

At the top of the south wall of the canyon 55 feet above creek-level, an area from 40 to 80 feet wide, and 100 feet long has been stripped. This exposes a zone of shearing striking north 57 degrees west, and dipping north-east at 75 degrees, 33 feet wide. Within this the most intense shearing is confined to a width of 6 feet which exhibits serpentinization and biotitization. A sparse mineralization of magnetite, pyrite and chalcopyrite is present. Distant 30 feet up-stream, another stripping 40 to 60 feet wide and extending south of the canyon for a distance of 50 feet, is now sloughed, but shows at one point a small amount of the minerals mentioned.

Placer.

As has been previously mentioned, it seems unlikely that many pre-Glacial placer deposits have survived the intense glaciation apparent in this area, although post-Glacial concentrations may quite likely be found in regions of gold-bearing rocks. The only known placer deposit of any importance in the area is that on Jimmay Creek (see Fig. 1).

JIMMAY CREEK — Three placer-mining leases on this creek, extending up-stream from a point about 1 mile above its mouth, are held by H. Olson and J. Hunderi of Takla Landing.

The property is reached by a trail about 1 1/2 miles long, which branches from the Germansen Landing-Aiken Lake winter road about half a mile south of the 52-Mile post. This post is 63 miles from Germansen Landing. The trail follows the right bank of Jimmay Creek on good grade to the workings, a tributary creek being crossed by a foot-log.

Near the workings and about 1 1/2 miles above its mouth, Jimmay Creek flows south 65 degrees west, in a rocky gorge about 175 feet deep, and somewhat over 1,000 feet long. Near the up-stream end of this gorge, no rock is exposed on the south bank of the creek, where a crescent-shaped low-lying bench, about 200 feet wide and 850 feet long flanks the creek, extending mainly up-stream from the gorge. South of this bench the valley slopes sharply upward to a wide hummocky bench occupied by a central depression, at a height of 125

feet above the creek.

Save in the rocky gorge, the valley-slopes contiguous to the workings and down to the level of the creek, are covered with dense vegetation and timber-growth. Rock is, however, exposed in the bed of the creek at most points for a distance of three-quarters of a mile above the head of the gorge. About three-eighths of a mile up-stream from the gorge the creek receives a tributary on its left bank.

Geology. The formation exposed in the gorge and at different points in the bed of the creek for three-quarters of a mile upstream, consists of silicified quartz-mica schists and quartz-sericite schists, which strike north 19 degrees west and dip about 50 degrees to the south-west. In them are a number of small, unmineralized quartz veins up to 1.5 feet in width, which follow the bedding-planes of the host-rocks. About three-quarters of a mile above the gorge, the schists are intruded by a small stock of granitic rock, which is exposed in the bed of the creek for a distance of 150 feet. These schists are lithologically similar to, and likely to be the same age as those which outcrop on the Osilinka River near its mouth, and are considered by the Geological Survey, Canada, to be Precambrian.

Type of Deposit. The deposit consists of gravel of a maximum thickness of 12 feet immediately overlying bed-rock in the up-stream part of the gorge of the creek. The gold found is both fine and very coarse; one nugget weighing 1 oz. 7 dwt. being found this year by the present owners. Although doubtless the finer gold results from re-sorted glacial debris, the coarse gold probably originated in pre-Glacial time. The deposit has been re-sorted, and probably results from the intersection of its pre-Glacial channel by the creek, at the head of the gorge. A segment of buried channel is indicated in the south bank of the creek. This is as yet unmined, but it is possible that the richest gravel in the re-sorted deposit was mined by the discoverer, and early subsequent operators.

In addition to the foregoing, a subordinate amount of gold has been recovered from re-sorted glacial gravel overlying a rock-bench on the north side of the creek at the upper end of the gorge.

History. Placer was first discovered at the lower end of the gorge by Jim May, a pioneer prospector in this region, forty years ago, about which time some work was done by an English syndicate following the discovery. Operations were

short-lived and subsequently the ground lay idle for many years until 1932 when Frank Martin of Hazelton acquired leases on the creek and continued prospecting for a few years. The ground was acquired in 1939 by the present owners, H. Olson and J. Hunderi, who, shortly after commencing work, found a nugget weighing 1 oz. 7 dwt., which naturally greatly stimulated their efforts. This early promise of good pay did not, however, materialize, and the owners stated, at the time of examination on August 22nd, that apart from their early discovery, results were disappointing, and they were on the point of leaving the creek.

Workings. Save for one shaft now filled with water, the depth of which is not known, all workings are surface diggings. Originally, Jim May evidently followed the gold found up-stream as far as the head of the gorge, and the indicated point of channel-intersection, where the depth to bed-rock is about 12 feet. The method of mining followed by early and present workers is to wing-dam the creek, and shovel the gravels overlying bed-rock into a sluice-flume. It was, apparently, the intention of the early workers to reach the former channel of the creek by a shaft sunk on the low-lying bench, previously described, which flanks the south bank of the creek at the head of the gorge and to drain this shaft by a long open-cut from the up-stream end of their diggings. If such was the original intention, however, it was stopped before completion. Later, miners including the present owners, have devoted their attention mainly to mining the more central part of the bed of the creek.

Such coarse gold as the nugget recovered this year, suggests that it is quite likely that the discoverer may have found good pay in the re-sorted gravels in the bed of the creek, up-stream from the point of discovery and as far as the head of the rock-gorge.

The topography suggests that a pre-Glacial channel-segment of the creek lies buried in its south bank from the head of the gorge down-stream. The re-sorted deposit appears to owe its origin to the fact that the post-Glacial creek incised a new channel differing somewhat from the earlier one. The new channel cuts the buried channel only at one point, immediately down-stream, from which has resulted the re-sorted deposit. Up-stream from the gorge, the creek has incised a post-Glacial channel in bed-rock. In this region, it is possible, although this is not clearly indicated by the topography, that the pre-Glacial channel lies buried to the north of the creek. If, as seems likely, the pre-Glacial channel is cut through at one point only, expectation of finding more

gold must centre in the buried channel. The position is, however, that this is not very clearly defined, the depth to bed-rock is unknown, and recovery of gold therein would entail sinking and drifting, the expense of which in this region, coupled with the factors of uncertainty, tends to discourage effort.